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IMPLEMENTATION PLAN REVIEW FOR DELAWARE AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT

TRW/Environmental Services

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IMPLEMENTATION PLAN REVIEW FOR DELAWARE AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT

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16. ABSTRACT

Section IV of the Energy Supply and Environmental Coordination Act of 1974, (ESECA) requires EPA to review each State Implementation Plan (SIP) to determine if revisions can be made to control regulations for stationary fuel combustion sources without interferring with the attainment and maintenance of the national ambient air quality standards. This document, which is also required by Section IV of ESECA, is EPA's report to the State indicating where regulations might be revised.

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IMPLEMENTATION PLAN REVIEW

FOR

DELAWARE

AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT

Prepared by the Following Task Force:

U. S. Environmental Protection Agency, Region III
6th and Walnut Streets
Philadelphia, Pennsylvania 19106

Environmental Services of TRW, Inc.
800 Follin Lane, SE, Vienna, Virginia 22180
(Contract 68-02-1385)

U. S. Environmental Protection Agency
Office of Air and Waste Management
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

March 1975

DELAWARE

ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT
(SECTION IV - STATE IMPLEMENTATION PLAN REVIEW)

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1.0 EXECUTIVE SUMMARY

The enclosed report is the U.S. Environmental Protection Agency's (EPA) response to Section IV of the Energy Supply and Environmental Coordination Act of 1974 (ESECA). Section IV required EPA to review each State Implementation Plan (SIP) to determine if revisions can be made to control regulations for stationary fuel combustion sources without interfering with the attainment and maintenance of the National Ambient Air Quality Standards (NAAQS). In addition to requiring that EPA report to the State on whether control regulations might be revised, ESECA provides that EPA must approve or disapprove any revised regulations relating to fuel burning stationary sources within three months after they are submitted to EPA by the States. The States may, as in the Clean Air Act of 1970, initiate State Implementation Plan revisions; ESECA does not, however require States to change any existing plan.

Congress has intended that this report provide the State with information on excessively restrictive control regulations. The intent of ESECA is that SIP's, wherever possible, be revised in the interest of conserving low sulfur fuels or converting sources which burn oil or natural gas to coal. EPA's objective in carrying out the SIP reviews, therefore, has been to try to establish if emissions from combustion sources may be increased. Where an indication can be found that emissions from certain fuel burning sources can be increased and still attain and maintain NAAQS, it may be plausible that fuel resource allocations can be altered for "clean fuel savings" in a manner consistent with both environmental and national energy needs.

In many respects, the ESECA SIP reviews parallel EPA's policy on clean fuels. The Clean Fuels Policy has consisted of reviewing implementation plans with regards to saving low sulfur fuels and, where the primary sulfur dioxide air quality standards were not exceeded, to encourage States to either defer compliance regulations or to revise the SO_2 emission regulations. The States have also been asked to discourage large scale shifts from coal to oil where this could be done without jeopardizing the attainment and maintenance of the NAAQS.

To date, EPA's fuels policy has addressed only those States with the largest clean fuels saving potential. Several of these States have or are currently in the process of revising SO_2 regulations. These States are generally in the Eastern half of the United States. ESECA, however, extends the analysis of potentially over-restrictive regulations to all 55 States and territories. In addition, the current reviews address the attainment and maintenance of all the National Ambient Air Quality Standards.

There are, in general, four predominant reasons for the existence of overly restrictive emission limitations within the State Implementation Plans. These are (1) the state's prerogative to surpass NAAQS; (2) the use of the example region approach in developing State-wide air quality control strategies; (3) the existence of state air quality standards which are more stringent than NAAQS; and (4) the "hot spots" in only part of an Air Quality Control Region (AQCR) which have been used as the basis for controlling the entire region. Since each of these situations effect many State plans and in some instances conflict with current national energy concerns, a review of the State Implementation Plans is a logical follow-up to EPA's initial appraisal of the SIP's conducted in 1972. At that time SIP's were approved by EPA if they demonstrated the attainment of NAAQS or more stringent state air quality standards. Also, at that time an acceptable method for formulating control strategies was the use of an example region for demonstrating the attainment of the standards.

The example region concept permitted a State to identify the most polluted Air Quality Control Region (AQCR) and adopt control regulations which would be adequate to attain the NAAQS in that region. In using an example region, it was assumed that NAAQS would be attained in the other AQCRs of the State if the control regulations were applied to similar sources. The problem with the use of an example region is that it can result in controls which are more stringent than needed to attain NAAQS, especially in the utilization of clean fuels, for areas of the State where sources would not otherwise contribute to NAAQS violations. For instance, a control strategy based on a particular region or source can result in a regulation requiring 1 percent sulfur oil to be burned state-wide where the use of 3 percent sulfur coal would be adequate to attain NAAQS in some locations.

EPA anticipates that a number of States will use the review findings to assist them in making the decision whether or not to revise portions of their State Implementation Plans. However, it is most important for those States which desire to submit a revised plan to recognize the review's limitations. The findings of this report are by no means conclusive and are neither intended nor adequate to be the sole basis for SIP revisions; they do, however, represent EPA's best judgment and effort in complying with the ESECA requirements. The time and resources which EPA has had to prepare the reports has not permitted the consideration of growth, economics, and control strategy tradeoffs. Also, there has been only limited dispersion modeling data available by which to address individual point source emissions. Where the modeling data for specific sources were found, however, they were used in the analysis.

The data upon which the reports' findings are based are the most currently available to the Federal Government. However, EPA believes that the States possess the best information for developing revised plans. The States have the most up-to-date air quality and emissions data, a better feel for growth, and the fullest understanding for the complex problems facing them in the attainment and maintenance of air quality. Therefore, those States desiring to revise a plan are encouraged to verify and, in many instances, expand the modeling and monitoring data supporting EPA's findings. In developing a suitable plan, it is suggested that States select control strategies which place emissions for fuel combustion sources into perspective with all sources of emissions such as smelters or other industrial processes. States are encouraged to consider the overall impact which the potential relaxation of overly restrictive emissions regulations for combustion sources might have on their future control programs. This may include air quality maintenance, prevention of significant deterioration, increased TSP, NO_x, and HC emissions which occur in fuel switching, and other potential air pollution situations such as sulfates.

Part of each State's review was organized to provide an analysis of the SO_2 and TSP emission tolerances within each of the various AQCRs. The regional emission tolerance estimate is, in many cases, EPA's only measure of the "over-cleaning" accomplished by a SIP. The tolerance assessments have been combined in Appendix B with other regional air quality "indicators" in an attempt to provide an evaluation of a region's candidacy for changing emission limitation regulations. In conjunction with the regional analysis, a summary of the State's fuel combustion sources (power plants, industrial sources and area sources) has been carried out in Appendices C, D and E.

The State Implementation Plan for Delaware has been reviewed for the most prevalent causes of over-restrictive fuel combustion emission limiting regulations. The major findings of the review are:

FOR BOTH TOTAL SUSPENDED PARTICULATES AND SULFUR DIOXIDE, THERE IS LITTLE TO NO INDICATION THAT CURRENT EMISSION REGULATIONS ARE OVER-RESTRICTIVE.

The supportive findings of the SIP review are:

National Ambient Air Quality standards for suspended particulates and sulfur dioxide were exceeded in the Metropolitan Philadelphia Air Quality Control Region during 1973, and is a poor candidate for revising emission regulations.

In the Southern Delaware Air Quality Control Region, there were no violations of National Ambient Air Quality Standards for either suspended particulates or sulfur dioxide during 1973. However there are no modeling data available to determine if an increase in emissions could be tolerated without exceeding standards. There are no regulatory limits on the fuel sulfur content in this region.

2.0 STATE IMPLEMENTATION PLAN REVIEW

2.1 SUMMARY

A revision of fuel combustion source emissions regulations will depend on many factors.

- Does the State have air quality standards which are more stringent than NAAQS?
- Does the State have emission limitation regulations for control of (1) power plants, (2) industrial sources, (3) area sources?
- Did the State use an example region approach for demonstrating the attainment of NAAQS or more stringent State standards?
- Has the State not initiated action to modify combustion source emission regulations for fuel savings; i.e., under the Clean Fuels Policy?
- Are there no proposed Air Quality Maintenance Areas?
- Are there indications of a sufficient number of monitoring sites within a region?
- Is there an expected 1975 attainment date for NAAQS in the State Implementation Plan?
- Based on (1973) air quality data, are there no reported violations of NAAQS?
- Based on (1973) air quality data, are there indications of a tolerance for increasing emissions?
- Are the total emissions from stationary fuel combustion sources proportionally lower than those of other sources?
- Do modeling results for specific fuel combustion sources show a potential for a regulation revision?

The following portion of this report is directed at answering these questions. An AQCR's potential for revising regulations increases when there are affirmative responses to the above.

The initial part of the SIP review report, Section 2 and Appendix A, was organized to provide the background and current situation information for the State Implementation Plan. Section 3 and the remaining Appendices provide an AQCR analysis which helps establish the overall potential for revising regulations.

Based on an overall evaluation of EPA's current information, AQCR's have been rated as either a good, poor or marginal candidate for revising emission limiting regulations. These ratings which are shown in Table 2-1 were determined by assessing the following criteria:

Good	Poor	Marginal
1) Adequate number of air monitoring sites	1) Violation of NAAQS	1) No air quality data or insufficient number of monitoring sites
2) No NAAQS violations	2) Attainment date for NAAQS later than 1975	2) Inconsistent "indicators"
3) Attainment date of 1975 for NAAQS in the SIP	3) Proposed AQMA	
4) No proposed AQMAs	4) Modeling results show no potential for regulation revision	
5) Modeling results show a potential for regulation revision		

For an AQCR to be rated as a good candidate, all of the criteria listed under "Good" would have to be satisfied. The overriding factor in rating an AQCR as a poor candidate is a violation of either the primary or secondary National Ambient Air Quality Standards during 1973. However, if any of the other conditions listed under "Poor" exists, the AQCR would still receive that rating. The predominant reason for a marginal rating is a lack of sufficient air quality data. In Priority III regions, air monitoring was not required during 1973, therefore, there may be no data with which to determine the current air quality status. Marginal ratings are also given when there are varying or inconsistent "indicators".

After a candidacy has been given to a region, a follow-up analysis should be conducted depending on the rating. A region that has been indicated to be a good candidate for regulation revision should be examined in more detail by the state and the Regional office of the EPA, including an examination of current air quality, emissions, and fuel use data, with which the state has more familiarity. If the state feels that clean fuels could be saved in a region rated marginal then an analysis of air quality data that may have become available since this report should be examined. If current data do not indicate a potential for regulation revision then

further study would not be warranted. An AQCR that has been indicated to be a poor candidate would not warrant further study unless the state feels that new information has become available indicating that the poor rating is no longer valid.

TABLE 2-I

DELAWARE STATE IMPLEMENTATION PLAN REVIEW
(SUMMARY)

"Indicators"	State of Delaware		Metropolitan Philadelphia AQCR 45		Southern Delaware AQCR 46	
	TSP	SO_2	TSP	SO_2	TSP	SO_2
• Does the State have air quality standards which are more stringent than NAAQS?	Yes	Yes				
• Does the State have emission limiting regulations for control of:						
1. Power plants	Yes	Yes				
2. Industrial sources	Yes	Yes				
3. Area sources	Yes	Yes				
• Did the State use an example region approach for demonstrating the attainment of NAAQS or more stringent State standards?	No	No				
• Has the State not initiated action to modify combustion source emission regulations for fuel savings; i.e., under the Clean Fuels Policy?	Yes	Yes				
• Are there no proposed Air Quality Maintenance Areas?			Yes	Yes	Yes	Yes
• Are there indications of a sufficient number of monitoring sites within a region?			Yes	Yes	Yes	Yes
• Is there an expected 1975 attainment date for NAAQS in the State Implementation Plan?			Yes	Yes	Yes	Yes
• Based on (1973) Air Quality Data, are there no reported violations of NAAQS?			No	No	Yes	Yes
• Based on (1973) Air Quality Data, are there indications of a tolerance for increasing emissions?			No	No	Yes	Yes
• Are the total emissions from stationary fuel combustion sources proportionally lower than those of other sources?			Yes	Yes	No	No
• Do modeling results for specific fuel combustion sources show a potential for a regulation revision?[a]			No	No	N.A.	N.A.
• Based on the above indicators, what is the potential for revising fuel combustion source emission limiting regulations?			Poor	Poor	Marg.	Marg.[b]

[a] Modeling data available for one power plant only

[b] There are no regulatory limits on the fuel sulfur content.

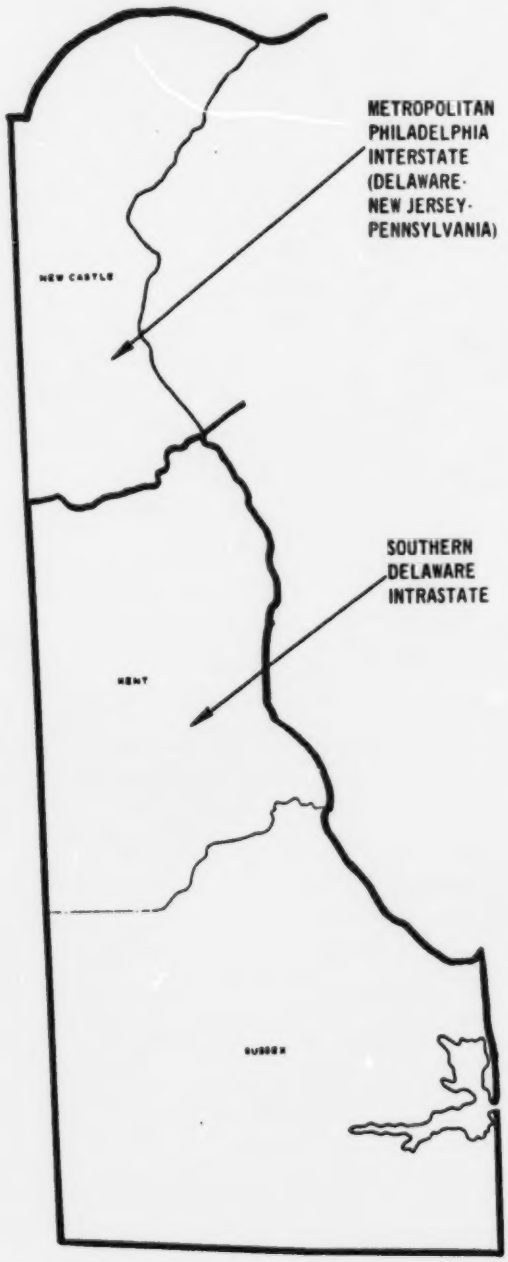

Figure 2-1 Delaware Air Quality Control Regions

2.2 AIR QUALITY SETTING FOR THE STATE OF DELAWARE

2.2.1 Delaware Air Quality Control Regions

The State of Delaware has been divided into two Air Quality Control Regions. The Federal designations of these regions and the other states that comprise the interstate region are as follows:

Metropolitan Philadelphia Interstate (Pennsylvania, New Jersey)
Southern Delaware Intrastate

The Metropolitan Philadelphia AQCR is classified Priority I for both suspended particulates and sulfur dioxide, while the Southern Delaware AQCR is classified Priority III for these pollutants. There are no proposed Delaware Air Quality Maintenance Areas in these regions.

2.2.2 Ambient Air Quality Standards

Delaware has adopted air quality standards for both suspended particulates and sulfur dioxide which are shown on Table A-2. The State standards for both pollutants are more stringent than the Federal standards, and the State has also adopted a one-hour primary standard for particulates and annual and 24-hour secondary standards for sulfur dioxide.

2.2.3 Air Quality Status

Air monitoring data for 1973 for total suspended particulates and sulfur dioxide are summarized in Tables A-4 and A-5 respectively. These data are from the SAROAD data bank as of July 1974, and the "Monthly Air Quality Data Summary," State of Delaware Department of Natural Resources and Environmental Control.

National Ambient Air Quality Standards for total suspended particulates were exceeded during 1973 in each of the three States comprising the Metropolitan Philadelphia Air Quality Control Region. Sulfur dioxide standards were also exceeded in the region.

There were no air quality violations during 1973 in the Southern Delaware AQCR, although there were not a substantial amount of data with which to determine the air quality status. As previously mentioned, this is a Priority III region for both suspended particulates and sulfur dioxide, therefore air monitors were not officially required during 1973.

2.2.4 Emissions Summary

A summary of particulate and sulfur dioxide emissions by region is presented in Tables A-6 and A-7 respectively. These data are from the "1972 National Emissions Report" June, 1974 which utilizes information in the National Emissions Data System (NEDS).

In the Delaware portion of the Metropolitan Philadelphia AQCR, fuel combustion sources account for approximately one-third of the particulate and sulfur dioxide emissions, while compared to the total AQCR emissions, Delaware fuel combustion sources contribute approximately one percent of the emissions. However in the Southern Delaware AQCR, fuel combustion sources contribute almost all of the particulate and sulfur dioxide emissions (Table A-8).

2.3 BACKGROUND ON THE DEVELOPMENT OF DELAWARE'S CURRENT STATE IMPLEMENTATION PLAN

2.3.1 Control Strategy for Particulate Matter and Sulfur Dioxide

The basis for recommending approval of the particulate matter and sulfur oxides control strategies for the Delaware portion (New Castle County) of the Metropolitan Philadelphia Interstate Air Quality Control Region was a modeling analysis prepared by EPA using the Implementation Planning Program (IPP). The analysis included: (1) an extensive update of the emission inventories in the "Existing" Sulfur Oxides and Particulate Matter Plans submitted by Delaware, Pennsylvania and New Jersey under the 1967 Clean Air Act, and evaluated under the provisions of Section 16 (Savings Provision) of the Clean Air Act, as amended in 1970; (2) a careful calibration of measured air quality data and predicted pollutant concentrations; and (3) the application of the emission limitations which were to be submitted with the final plans. The emission limitations applied to the sources located in the Delaware portion of the Region follow:

A. Sulfur dioxide

1. Fuel combustion. The maximum sulfur content by weight for all fuels is 1.0%. The regulation submitted in the plan also limited distillate oil to 0.3% by weight.

B. Particulate Matter

1. Fuel combustion. For equipment with a heat input equal to or greater than 500,000 BTU per hour particulate emissions shall not exceed 0.3 pounds per million BTU heat input.

The results of the analysis showed that the expected concentrations would be below the national standards for sulfur oxides and particulate matter. Furthermore, the modeling showed that additional control of Delaware sources would have little impact upon the areas with the highest concentrations in the Region (Philadelphia-Camden area), primarily due to the distances from the sources in Delaware to these areas. While the predicted concentrations did not include growth, it was estimated that a 22 percent growth in sulfur oxides emissions and a 13 percent growth in particulate matter emissions could be tolerated by 1975 before the secondary standards would be exceeded in Delaware. In addition, the Delaware regulations provided for additional point source control of particulate matter and a further reduction of the fuel sulfur content if, between July 1, 1973, and October 1, 1974, the secondary standards were exceeded in New Castle County. These measures, the requirement that all new sources comply with the Federal Standards of Performance for New Sources, and Delaware's control of construction and modification of sources could be used to prevent pollutant concentrations from exceeding the secondary standards. It was recommended that the State of Delaware undertake a comprehensive study of growth patterns and trends for each pollutant category to help assess future control needs.

The Southern Delaware Intrastate Air Quality Control Region is Priority III for particulate matter and sulfur oxides. Therefore, the plan needed only to provide a strategy for insuring that the secondary standards would be maintained. The plan stated that Delaware intended to maintain the standards through strict control of new sources. The State also has emission-limiting regulations which apply to this Region.

3.0 CURRENT ASSESSMENTS BASED ON STATE IMPLEMENTATION PLAN REVIEW

The purpose of this section is to evaluate the available information for the State of Delaware and determine the feasibility of revisions to the SIP which would result in clean fuel conservation. The assessments will be made by AQCR addressing each type of fuel combustion source: power plants, large industrial and commercial/institutional sources, and area sources. The assessments must be made for each pollutant separately and are made on the basis of seven criteria: (1) 1973 air quality violations; (2) expected NAAQS attainment dates; (3) proposed Air Quality Maintenance Area (AQMA) designations; (4) total emissions; (5) portion of emissions from Delaware fuel combustion sources; (6) regional tolerance for emissions increase; and (7) pollutant priority classifications. Tables B-1 and B-2 tabulate these criteria for TSP and SO_2, respectively.

As mentioned previously, regional air quality data for 1973 are presented in Tables A-4 and A-5 for total suspended particulates and sulfur dioxide respectively. Table C-1 shows the 1973 fuel use and fuel sulfur content for the Delaware power plants. Table C-2 is a summary of modeling results for one of the power plants.[1] Although it is realized that there are some limitations to results obtained by modeling, it is presented in this report as another indicator in assessing the candidacy of a region to revise emission regulations.

Appendix D shows the fuel use and emissions data for the major fuel combustion sources that were listed in the NEDS emission inventory. Only those sources emitting 100 tons per year or more of either particulates or sulfur dioxide are listed. Appendix E shows the total fuel use for the two Delaware Air Quality Control Regions.

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[1] The modeling analysis of the power plants was performed by the Walden Research Division of Abcor Inc. The model used was a Gaussian plume model developed by the Meteorology Laboratory, EPA, and was based on 1972 plant operations. Detailed information can be found in; Modeling Analysis of Power Plants for Fuel Conversion, (Group II) September 4, 1974.

3.1 METROPOLITAN PHILADELPHIA INTERSTATE AIR QUALITY CONTROL REGION

3.1.1 Regional Assessment

This region has been rated a poor candidate for revision of either particulate or sulfur dioxide emission limits. During 1973, ambient levels of total suspended particulates exceeded Federal standards in each of the three States in this region. The highest annual average was recorded in the Pennsylvania portion of the region, while the highest 24-hour value was recorded in Delaware (Table A-4). Violations of the 24-hour standard also occurred in New Jersey. There is virtually no potential for an increase in particulate emissions in this region without further jeopardizing air quality standards.

The Federal annual standard for sulfur dioxide was not exceeded in the region during 1973, although it was equalled in the New Jersey portion of the AQCR. A violation of the 24-hour standard was recorded in Delaware and Pennsylvania. As with particulates, there is no tolerance for an increase in sulfur dioxide emissions in the region.

3.1.2 Power Plant Assessment

There are two Delaware power plants in this region, having a combined generating capacity of over 900 MW. Both of these plants were multi-fuel fired during 1973. The smaller of the two plants, Delaware City, has been firing high sulfur fuels, with the fluid coke containing an average sulfur content of 6.7%, and the fuel oil containing over 2% sulfur. The plant also used a large amount of refinery gas. Even if there was a possibility of revising emission limits in this region, a clean fuel savings could not be achieved at this plant.

The Edge Moor plant in Wilmington is primarily oil fired, but also used a small amount of natural gas during 1973. This plant consists of five boilers, four of which are convertible to coal. Particulate control equipment has tested efficiencies (1971) of 66%, 63%, 57%, and 95% respectively, on units 1-4. Table C-2 summarizes the results of modeling analysis for the plant showing the maximum contribution to ambient particulate and sulfur dioxide levels that would occur as a result of a switch to 2.5% sulfur coal. The data indicate that under certain conditions, the emissions from

this plant alone could cause violations of the primary 24-hour standard for SO_2, and severely impact particulate levels. The meteorological conditions which are associated with the highest ground-level contributions by this plant are estimated to occur about twenty-five percent of the time.

3.1.3 Industrial, Commercial, Institutional Source Assessment

There are several major fuel combustion sources in the Delaware portion of this region, which are listed in Table D-1. All of these sources are firing oil representing a clean fuel savings potential, however because of the air quality status there is no potential for a switch to coal or a higher sulfur content fuel oil. Delaware point source fuel combustion accounts for approximately five percent of the particulate and sulfur dioxide emissions in the region.

3.1.4 Area Source Assessment

Area source fuel use is shown in Table E-1. Based on the total amount of fuel used, there is not a significant clean fuel savings afforded by these sources. Area source fuel combustion accounts for approximately three percent of the particulate emissions and thirty percent of the sulfur dioxide emissions.

3.1.5 Fuel Use Assessment

Appendix E shows the fuel use for the region which accounts for the majority of the oil and natural gas used in the State. Coal use is not substantial in the region.

3.2 SOUTHERN DELAWARE AIR QUALITY CONTROL REGION

3.2.1 Regional Assessment

This region has been rated marginal for revision of either particulate or sulfur dioxide emission limits. This rating was given since there were no modeling data for any fuel combustion sources in the region to determine if there is a tolerance for an increase in emissions without violating National Ambient Air Quality Standards. Also, there is no regulatory limit on the sulfur content of fuel in this region.

There were no violations of the Federal standards for either suspended particulates or sulfur dioxide during 1973 in this region (Tables A-4, A-5). Suspended particulate data for 1974 also indicate that there were no violations.

3.2.2 Power Plant Assessment

There are two power plants in this region, the Indian River plant in Sussex County, and McKee Run in Kent County. These plants which have a combined generating capacity of 373 MW contribute approximately eleven percent of the particulate and seventy percent of the sulfur dioxide emissions in the region.

The Indian River plant is coal fired, therefore it does not have a fuel switch case. The McKee Run plant is dual fired (oil and gas), however the plant is small with a correspondingly low amount of fuel use (Table C-1). There is not a significant clean fuel savings potential afforded by these plants.

3.2.3 Industrial, Commercial, Institutional Source Assessment

The major fuel combustion sources in this region are listed in Table D-1. These sources are all firing oil of a moderate sulfur content, thereby affording little potential clean fuel savings. Point source fuel combustion in the region contributes approximately thirty-nine percent of the particulate emissions and twenty-two percent of the sulfur dioxide emissions.

3.2.4 Area Source Assessment

Area source fuel use in this region is shown in Table E-1, and as in the Metropolitan Philadelphia AQCR, these sources do not afford a significant clean fuel savings potential. Area sources contribute approximately thirty-eight percent of the particulate emissions and seven percent of the sulfur dioxide emissions in the region.

3.2.5 Fuel Use Assessment

Fuel use data by the region are presented in Appendix E.

APPENDIX A

STATE IMPLEMENTATION PLAN BACKGROUND

TABLE A-1

AIR POLLUTANT PRIORITY CLASSIFICATIONS

Air Quality Control Region	Priority Classification[a]		1975 Population (Millions)	Proposed AQMA Designations[b]
	Part.	SO_2		
Metropolitan Philadelphia Interstate (New Jersey, Penn.)	I	I	6.07	None[c]
Southern Delaware Intrastate	III	III	0.18	None

[a] Criteria based on maximum measured (or estimated) pollution concentration in area:

Priority	I	II	III
	Greater than ($\mu g/m^3$)	From - To ($\mu g/m^3$)	Less than ($\mu g/m^3$)
Sulfur Dioxide			
Annual arithmetic mean	100	60 - 100	60
24-hour maximum	455	260 - 455	260
Particulate matter:			
Annual geometric mean	95	60 - 95	60
24-hour maximum	325	150 - 325	150

[b] Federal Register, August, 1974, SMSA's showing potential for NAAQS violations due to growth.

[c] Delaware portion only

TABLE A-2

AMBIENT AIR QUALITY STANDARDS

All Concentrations In $\mu g/m^3$

		Total Suspended Particulates			Sulfur Oxides		
		Annual	24-Hour	1-Hour	Annual	24-Hour	3-Hour
Federal	Primary	75(G)	260[a]	---	80(A)	365[a]	---
	Secondary	60(G)	150[a]	---	--	--	1300[a]
State	Primary	70(G)	200[a]	500[a]	70(G)	260[b]	---
				---	80(A)	340[a]	---
	Secondary	60(G)	150[a]	---	60(A)	260[a]	1300[a]

(G) Geometric mean

(A) Arithmetic mean

[a] Not to be exceeded more than once per year

[b] 99th percentile value, not to be exceeded

TABLE A-3

AIR QUALITY STANDARDS ATTAINMENT DATES[a]

Air Quality Control Region	Particulates		Sulfur Dioxide	
	Primary	Secondary	Primary	Secondary
Metropolitan Phil.	1/72	1/74	1/72	1/74
Southern Delaware	b	b	b	b

[a] From State Implementation Plan

[b] Air quality levels below secondary standards at time of submission of SIP

TABLE A-4

AIR QUALITY STATUS, TSP

Air Quality Control Region	# Stations Reporting	TSP Concentration($\mu g/m^3$) Highest Reading Annual	Highest Reading 24-Hr	2nd Highest Reading 24-Hr	# Stations Exceeding National Ambient Air Quality Standards: Primary Annual	Primary 24-Hr[b]	Secondary Annual	Secondary %	Secondary 24-Hr[b]	Secondary %	% Reduction Required to Meet Standards[c]	Standard on Which % Reduction Is Based
Metropolitan Phil.[a]	60[d]	87[e]	558	383	1	3	2	3	13	22	+67	24-Hour
1974 Delaware Air Quality[f]	13	137	415	337	1	1	2	15	2	15	[g]	
Southern Delaware	3	--	207	117	-	0	-	-	0	--	[h]	24-Hour
1974 Delaware Air Quality[f]	3	47	158	---	0	0	0	-	0	-	[h]	

[a] 1973 Air Quality Data in National Air Data Bank, July 28, 1974

[b] Violations based on more than one reading in excess of standard

[c] Formula: $\left(\frac{\text{2nd Highest 24 Hr - 24 Hr Secondary Standard}}{\text{2nd Highest 24-Hr - Background}}\right) \times 100$, $\left(\frac{\text{Annual - Annual Secondary Standard}}{\text{Annual - Background}}\right) \times 100$

Background values: 37.5 $\mu g/m^3$ in Metropolitan Philadelphia AQCR, 30 $\mu g/m^3$ in Southern Delaware AQCR

[d] Total number of stations in AQCR

[e] Reading recorded in Pennsylvania portion of AQCR

[f] Data from State of Delaware Department of Natural Resources and Environmental Control, covering the period from February 1, 1974 to January 31, 1975.

[g] The particulate problem at two stations where standards are exceeded are due to localized problems. Local control action rather than regional reduction is indicated.

[h] Reduction not required

TABLE A-5

AIR QUALITY STATUS, SO_2[a]

Air Quality Control Region	# Stations Reporting 24-Hr Bubbler	# Stations Reporting Contin.	SO_2 Concentration($\mu g/m^3$) Highest Reading Annual	Highest Reading 24-Hr	2nd Highest Reading 24-Hr	# Stations Exceeding National Ambient Air Quality Stds. Primary Annual	Primary 24-Hr[b]	Secondary 3-Hr	% Reduction Required To Meet Standards[c]	Standard on Which % Reduction Is Based
Metropolitan Phil.	11	25	80[d]	416[e]	416[f]	0	1	0	+12	24-Hour
Southern Delaware	1	0	--	86	18	0	0	0	g	24-Hour

[a] 1973 Air Quality Data in National Air Data Bank, July 28, 1974

[b] Violations based on more than one reading in excess of standard

[c] Formula: $\left(\frac{\text{2nd Highest 24 Hr - 24 Hr Secondary Standard}}{\text{2nd Highest 24-Hr}}\right) \times 100$, $\left(\frac{\text{Annual - Annual Secondary Standard}}{\text{Annual}}\right) \times 100$

[d] Reading recorded in New Jersey Protion of AQCR

[e] Reading recorded in Pennsylvania Portion of AQCR

[f] Highest reading used since 2nd highest reading not available

[g] Reduction not required

TABLE A-6

DELAWARE PARTICULATE EMISSIONS SUMMARY[a]

Air Quality Control Region	Total Emissions (10^3 tons/yr)	%	Electricity Generation (10^3 tons/yr)	%	Point Source Fuel Combustion[b] (10^3 tons/yr)	%	Area Source Fuel Combustion (10^3 tons/yr)	%
Metropolitan Phil.								
Delaware	31.8	3	0.3	1	1.6	5	9.4	30
Other (Penn., N.J.)	1018.1	96	12.8	1	118.8	12	186.9	18
Total	1049.9	99	13.1	1	120.4	11	196.3	19
Southern Delaware	8.8	1	1.0	11	3.4	39	3.3	38
Total	1058.7	100	14.1	1	123.8	12	199.6	19

[a] Source: 1972 National Emissions Report, EPA, June 1974

[b] Excludes emissions from electricity generation

TABLE A-7

DELAWARE SULFUR DIOXIDE EMISSIONS SUMMARY[a]

Air Quality Control Region	Total Emissions (10^3 tons/yr)	%	Electricity Generation (10^3 tons/yr)	%	Point Source Fuel Combustion[b] (10^3 tons/yr)	%	Area Source Fuel Combustion (10^3 tons/yr)	%
Metropolitan Phil								
Delaware	194.1	22	49.7	26	9.5	5	5.4	3
Other (Penn., N.J.)	668.8	74	281.0	42	131.6	20	187.7	28
Total	862.9	96	330.7	38	141.1	16	193.1	22
Southern Delaware	36.6	4	25.7	70	8.0	22	2.4	7
Total	899.5	100	356.4	40	149.1	17	195.5	22

[a] Source: 1972 National Emissions Report, EPA, June 1974

[b] Excludes emissions from electricity generation

TABLE A-8

DELAWARE FUEL COMBUSTION SOURCE SUMMARY

Air Quality Control Region	Power Plants[a]	Other Fuel Combustion[b] Point Sources		Total Emissions[c] 10^3 tons/yr		% Emissions From Delaware Fuel Combustion Sources[d]	
		Part.	SO_2	Part.	SO_2	Part.	SO_2
Metropolitan Phil.	2	3	16	1049.9	862.9	1	7
Southern Delaware	2	1	6	8.8	36.6	88	99
Total	4	4	22	1058.7	899.5		

[a] Delaware power plants only

[b] Delaware sources which contribute 100 tons or more per year of particulate or sulfur dioxide emissions

[c] AQCR total

[d] Percent of total AQCR emissions

TABLE A-9

SUMMARY OF DELAWARE FUEL COMBUSTION EMISSION REGULATIONS

I. Particulate Matter

Particulate emissions are not to exceed 0.3 pounds per million BTU heat input, maximum 2-hour average, from any fuel burning unit. This regulation does not apply to units having a heat input of less than one million BTU's.

II. Sulfur Dioxide

A. Limit on Sulfur Content of Fuel

1. No person shall offer for sale, sell or purchase any fuel having a sulfur content greater than one (1.0) percent by weight when such fuel is intended for use in any fuel burning equipment in New Castle County. No person shall use any fuel having a sulfur content greater than one (1.0) percent by weight in any fuel burning equipment in New Castle County. In Kent and Sussex counties, there is no regulatory limit on the sulfur in fuel.

2. No person shall offer for sale, sell, purchase or use in any fuel burning equipment, distillate fuel oil having a sulfur content greater than 0.3 percent by weight.

B. Emission Control in Lieu of Sulfur Content Limits of Section A.

1. The limits on sulfur content established by Section A shall not apply to any fuel burning equipment employing emission control which limits sulfur dioxide emission to that which would result from burning, without emission control, a fuel permitted by Section A. In order to employ an emission control rather than sulfur content limits as a means of complying with this Regulation, an owner or operator of fuel burning equipment must demonstrate to the Department in advance that the equivalent emission will be achieved.

APPENDIX B

REGIONAL SUMMARY

TABLE B-1

REGIONAL INDICATORS FOR REVISION OF PARTICULATE EMISSION REGULATIONS

Air Quality Control Region	Air Quality		Particulate Emissions (10^3 tons/yr)[c]	% Emissions From Delaware Fuel Combustion	TSP Priority	Attainment Dates[d]	AQMAs Proposed?
	Number of Stations[a]	Number of Violations[b]					
Metropolitan Phil.	60	15	31.8	1	I	1/72	No[f]
Southern Delaware	3	0	8.8	88	III	e	No

[a] Total number of stations in AQCR

[b] Number of violations of secondary standards in AQCR

[c] Delaware emissions from all sources

[d] As submitted in Delaware SIP (Primary Standard)

[e] Air quality levels below standards at time of SIP submittal

[f] Delaware portion only

TABLE B-2

REGIONAL INDICATORS FOR REVISION OF SULFUR DIOXIDE EMISSION REGULATIONS

Air Quality Control Region	Air Quality		SO_2 Emissions (10^3 tons/yr)[b]	% Emissions From Delaware Fuel Combustion	SO_2 Priority	Attainment Dates[c]	AQMAs Proposed?
	Number of Stations[a]	Number of Violations					
Metropolitan Phil.	34	1	194.1	7	I	1/72	No[e]
Southern Delaware	1	0	36.6	99	III	d	No

[a] Total number of 24-hour bubbler and continuous monitoring stations in AQCR

[b] Delaware emissions from all sources

[c] As submitted in Delaware SIP (Primary Standard)

[d] Air quality levels below standards at time of SIP submittal

[e] Delaware portion only

APPENDIX C

POWER PLANT SUMMARY

TABLE C-1

POWER PLANT FUEL USE SUMMARY[a]

Air Quality Control Region	Plant	1973 Capacity (MW)	1973 Fuel Use			1974 Fuel % S	% S SIP
			Type	% S	Quantity[b]		
Metropolitan Phil.	Delaware City	120.0	Fluid Coke	6.7	169[c]	6.65	1.0
			Oil	2.29	1639	1.21	
			Gas		4116		
	Edge Moor	789.0	Oil	0.5	4528	0.9	1.0
			Gas		631		
Southern Delaware	Indian River	340.0	Coal	1.62	814	1.65	---
	McKee Run	33.0	Oil	1.05	354	1.79	---
			Gas		181		

[a] Source: Air Resources Section, Delaware Department of Natural Resources and Environmental Control

[b] Coal quantity is in 10^3 tons, oil is in 10^3 barrels, gas is in 10^6 cu. ft.

[c] Fluid coke figures given in 10^3 tons

TABLE C-2

SUMMARY OF POWER PLANT MODELING RESULTS[a]

Air Quality Control Region	Plant	Maximum 24-Hour Concentration ($\mu g/m^3$) SO_2 Nominal Load	SO_2 Maximum Load	Particulates Nominal Load	Particulates Maximum Load	Maximum Annual Concentration ($\mu g/m^3$) SO_2	Maximum Annual Concentration ($\mu g/m^3$) Particulates
Metropolitan Phil.	Edge Moor						
	1972 Operations	89	108	9	9	--	--
	Fuel Switch #1[b]	404	491	193	237	--	--
	Fuel Switch #2[c]	437	491	206	237	--	--

[a] Source: Modeling Analysis of Power Plants for Fuel Conversion (Group II) Walden Research, Sept. 4, 1974

[b] Switch oil consumption to 2.5% coal in units 1-4

[c] Switch oil and natural gas consumption to 2.5% coal in units 1-4

ADDENDUM TO APPENDIX C

USE AND LIMITATIONS OF MODELING ANALYSIS DATA[a]

1. The data inputs for the modeling have been extracted from the appropriate FPC Form 67 and the most representative meteorological data available. However, to calculate the occurrence of the highest 24-hour concentration, assumptions as to the daily emission rate are necessary. The results of the modeling exercise provide a range of the most probable maximum concentration.

2. It should be recognized that time and data constraints are such that the model predictions are useful but not omniscient. There are no data available, in general, to "validate" the model. Therefore, all relevant data, including hard data on actual daily plant operations, should be obtained, reviewed, and evaluated. In this way, the modeling results can be used as a logical part of the entire decision-making framework, not as an arbitrary, dogmatic absolute "answer", divorced from the real situation involved. In some cases it will be necessary to adjust the model's predictions based upon more complete and detailed information on a particular plant's operations.

3. Results of these evaluations are not intended to be used in any legal actions, including both public hearing and court proceedings. The very nature of atmospheric dispersion modeling is such that results are not suitable to legally prove (or disprove) a particular modeling result. The assumptions and judgments necessarily involved in modeling tend to mitigate against proof in a legal sense.

4. The best use of the data is in negotiations with states or sources in trying to establish a rational course of action to be followed with reasonable assurance that the air quality impact will be as indicated by the model.

[a]Extracted from comments by the Monitoring and Data Analysis Division, OAQPS

APPENDIX D

INDUSTRIAL, COMMERCIAL, INSTITUTIONAL SOURCE SUMMARY

TABLE D-1

INDUSTRIAL, COMMERCIAL, INSTITUTIONAL FUEL COMBUSTION SOURCES[a]

Air Quality Control Region	Source	Fuel Use			Emissions (Tons/Year)	
		Type	% S	Amount[b]	Part.	SO_2
Metropolitan Phil.	Sunolin Chemical Co.	Oil Gas	1.0	704.8 3356.0	340	2090
	E.I. DuPont (Wilmington)	Oil	1.0	380.2	184	1254
	Amoco Chem.	Oil	1.0	315.3	153	1034
	I C I America	Oil Gas	1.0	176.2 236.0	82	543
	E.I. DuPont (Experimental Station)	Oil	0.75	180.0	87	445
	National Vulcan	Oil	1.0	109.5	8	361
	Phoenix Steel	Oil	1.4	68.1	33	341
	Chrysler Corp.	Oil	0.8	119.4	57	319
	Allied Chemical	Oil	1.0	86.9	42	286
	Container Corp. of America	Oil	1.0	79.3	38	261
	General Motors	Oil	0.84	92.4	44	255
	E.I. DuPont (Pigments Plant)	Oil	1.0	85.4	39	253
	J. Bancroft & Sons	Oil	0.8	94.8	46	250
	Univ. of Delaware	Oil	1.0	59.2	26	194
	E.I. DuPont (Chestnut Labs)	Oil	0.75	62.2	30	155
	Hercules Inc.	Oil	1.0	38.7	17	128
Southern Delaware	E.I. DuPont	Oil	2.1	898.6	226	6230

TABLE D-1 cont.

Air Quality Control Region	Source	Fuel Use			Emissions Tons/Year	
		Type	% S	Amount[b]	Part.	SO_2
Southern Delaware (cont.)	General Foods	Oil	2.0	93.1	45	618
	Draper Canning	Oil	2.3	50.1	24	379
	Dover AFB	Oil	0.71	81.2	39	190
	Standard Brands	Oil	2.0	21.2	7	126
	Townsend's Inc.	Oil	1.0	31.0	15	102

[a] Sources which emit 100 tons or more per year of either particulates or sulfur dioxide are listed in decreasing order of SO_2 emissions. Data are from National Emissions Data System.

[b] Fuel quantity, oil is in 10^3 barrels, gas is in 10^6 cu. ft.

APPENDIX E. AQCR FUEL USE SUMMARY

TABLE E-1

FUEL USE SUMMARY[a]

Air Quality Control Region	Coal (10^3 tons)		Oil (10^3 Barrels)		Gas (10^6 cu. ft.)		Coke (10^3 tons)
	Anthracite	Bituminous	Residual	Distillate	Natural	Process	
Metropolitan Phil.							
Area Sources							
Residential	8	0	0	1,628	9,100	0	0
Industrial	3	119	0	106	4,300	0	0
Comm/Inst.	3	4	59	453	3,200	0	0
Total	14	123	59	2,187	16,600	0	0
Point Sources							
Elec. Gen.	0	0	5,575	28	2,057	0	183
Industrial	0	0	2,649	321	5,170	2,869	0
Comm/Inst.	0	0	370	3	100	0	0
Total	0	0	8,594	352	7,327	2,869	183
GRAND TOTAL	14	123	8,653	2,539	23,927	2,869	183
Southern Delaware							
Area Sources							
Residential	3	0	0	923	1,220	0	0
Industrial	1	41	0	55	1,470	0	0
Comm/Inst.	1	1	16	129	890	0	0
Total	5	42	16	1,107	3,580	0	0
Point Sources							
Elec. Gen	0	833	337	7	277	0	0
Industrial	0	0	1,111	29	368	0	0
Comm/Inst.	0	0	111	0	0	0	0
Total	0	833	1,559	36	645	0	0
GRAND TOTAL	5	875	1,575	1,143	4,225	0	0

[a] Source: Stationary Source Fuel Summary Report (NEDS) December, 1974